DOCUMENT RESUME

ED 372 730 IR 016 655

AUTHOR Sponder, Barry
TITLE Teaching from an Environmental Perspective: A Model for Using Instructional Technology To Promote an Integrated Curriculum.
PUB DATE Sep 93
NOTE 11p.; Paper presented at the Annual Conference of the Singapore Educational Research Association (7th, Singapore, September 1993).
PUB TYPE Reports - Evaluative/Feasibility (142) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Curriculum Development; Educational Media; *Educational Technology; Elementary Secondary Education; *Environmental Education; Foreign Countries; Instructional Design; *Integrated Activities; Intellectual Disciplines; Lesson Plans; Models; *Teaching Methods
IDENTIFIERS Curriculum Integration Matrix

ABSTRACT

Teachers can help their students to integrate concepts from various disciplines and to develop an appreciation for the complexities of the environment through creative instructional strategies and imaginative uses of educational media. This involves teaching from an environmental perspective. This paper introduces an instructional model that uses media as a foundation for creating and implementing strategies that both teach and reinforce concepts from an integrated environmental perspective. A curriculum integration matrix (CIM) is used to help teachers link ideas from two or more subject areas. Steps in the instructional process include: (1) identifying the main subject topic, lesson subtopics, target concepts, and available teaching time; (2) describing the lesson content; (3) choosing additional integration topics using the subject table; (4) focusing on the integrated topic; (5) deciding on presentation method and instructional media; (6) describing or sketching the integrated media; and (7) completing the matrix by summarizing the process and rewriting the fully integrated lesson. Four figures illustrate the model and process. (Contains 28 references.) (SLD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED 372 730

Teaching from an Environment Perspective: A Model for Using Instructional Technology to Promote an Integrated Curriculum

by Prof. Barry Sponder

Nan Yang Technological University
19A Toh Tuck Road
#03-04 Green Lodge Condominum
Singapore 2159

IR016655

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Barry Sponder

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

Paper presented at the Seventh Annual Conference of the Singapore Educational Research Association, September 24, 1993.

Keywords: Curriculum integration; integrating technology into the curriculum; environmental teaching; ;educational technology; Curriculum Integration Matrix (CIM); elementary grades; secondary grades; writing across the curriculum; instructional media; Singapore

Teaching From An Environmental Perspective: A Model For Using Instructional Technology To Promote An Integrated Curriculum

Barry Sponder

INTRODUCTION

Educators have a unique opportunity and an important responsibility to help students to develop attitudes and habits that encourage them to respect and to care for the environment. If school is on-the-job training for life, then classroom instruction should reflect the interconnectedness of natural phenomena and help us to understand our responsibilities for using and protecting the world's limited resources. Not surprisingly, many of the most heralded and beneficial applications of modern technology such as nuclear power, chemical pesticides and even aerosol sprays have been found, upon deeper investigation, to have hidden and potentially ominous implications for both the environment and for humanity. Consequently, a successful program for environmental education involves more than just teaching about recycling, pollution or ecology. What is necessary is a systematic instructional approach that helps students to appreciate the connections among different elements of the world and their mutual influence on each other (Schwenk, 1978; Burke, 1980; Elliot, 1993).

Although philosophers from Plato (Lavine, 1984) and Confucius (Tong, 1970) to John Dewey (1938) stressed that knowledge should be grounded in the environment, tempered with wisdom and inculcated with values, the modern curriculum tends to categorize information into discreet and objective academic disciplines that are taught and evaluated as autonomous subjects rather than as part of a complex and interconnected reality (Smith, 1986; Pirsig, 1974). This Aristotelian compartmentalization of knowledge tends to encourage narrow specialization and often leads to the abdication of decision-making to "subject-matter experts." While Confucius (Tong, 1970), Goethe (Schweitzer, 1948), Plato (Lavine, 1984) and others promoted the ideal of the responsible, educated, moral citizen, the segmented curriculum tends to focus on behavioral objectives, short-term goals, terminal testing and organized competition, sometimes at the expense of cognitive understanding, moral development, emotional growth, long-range planning, and interpersonal cooperation.

DEVELOPING AN ENVIRONMENTAL PERSPECTIVE

While schools offer a standardized curriculum based upon different academic disciplines, life's events occur within complex, episodic, culturally-determined, integrated frames of reference. For example, a simple activity such as buying fruit at the wet market combines many topics including science (to recognize the different kinds of fruit and to know which are in season); language (to bargain for a good price); history (to understand why the prices have gone up or down); culture (to know and appreciate exotic fruit such as durians); and mathematics (to understand how to calculate the cost of fruit). The transaction can be affected by time (Is the fruit fresh or has it been on display all week?), or context (The lunar new year is coming so we need to buy oranges). Although teaching individual subjects can be useful, a good education gives people the ability to synthesize learning experiences, thereby making their degree more than just the aggregate of individual courses.

Teachers can help their students to integrate concepts from various disciplines and to develop an appreciation for the complexities of the environment through creative instructional strategies and imaginative uses of educational media (Sponder, in press). This involves *teaching from an environmental perspective,* combining different subjects to promote a deeper understanding of how phenomena are interrelated. It also involves recognizing that what appears to be a simple transaction, such as buying fruit, is really a synthesis of many converging perspectives. An environmentally-sensitive curriculum can begin in the earliest grades and continue throughout formal education.

INTEGRATING THE CURRICULUM THROUGH TECHNOLOGY

This paper introduces an instructional model that uses media as a foundation for creating and implementing strategies that both teach and reinforce concepts from an integrated, environmental perspective. Although some curriculum overlap undoubtedly take place in most classrooms, either by accident or by design, *the aim of this model is to habitualize the process so that it happens more often.* The model uses a **Curriculum Integration Matrix**© (CIM) to help teachers to link ideas from two or more subject areas (see Figure 1). The CIM is intended for use before the lesson plan is created but can also help in it's preparation. Some assumptions of the model are as follows: 1. As public school graduates themselves, teachers are familiar with the grade-level concepts and prerequisite knowledge for most subjects, or they have access to the appropriate curriculum guides so they can look them up. 2. Teachers have a basic knowledge of their students' cultural and social backgrounds. 3. Teachers want to teach from an environmental perspective.

Figure 1. Curriculum Integration Matrix (CIM) ©Sponder, 1993

1a.Main subject area & topic:
1b.Lesson subtopics:
1c.Lesson concepts:
1d.Length of lesson: (30 min /60 min) **•No. of class periods for main topic:**

2. Lesson content (2-3 sentences):

3. Subject Table: Choose one or two topics from below and investigate links to the main topic (Use bubbling, brainstorming or other techniques if the associations are not apparent).

Math	English	Social Studies	Science	Physical Education	Art	Music	Moral Education
basic facts	writing	local	nature	health	color	song	respect
basic operations	reading	regional	deductive reasoning	skills	form	instrument	culture
story problems	speaking	world-wide	inductive reasoning	sports	cultural expression	dance & movement	self-knowledge

Grade-level concepts for subjects that are covered in the curriculum guide
Prior knowledge either learned in school or encountered outside of school

4. Integrated topic (Redefine with a paragraph):

5a. Presentation Method
- •Lecture
- •Demonstration
- •Story
- •Question and answer
- •Group work
- •Writing activities
- •Media
- •Discovery
- •Etc.

5b. Instructional Technology
- •Overhead projector
- •Computer
- •Chalkboard
- •Audiocasette
- •Videocassette
- •Pocket chart
- •Commercial ILS
- •Compact disc
- •Videodisc
- •DVI
- •Writing
- •Posters
- •Realia
- •Puppets
- •Film
- •Filmstrip
- •Television
- •Etc.

6. Integrated media (describe or sketch):

7. Integrated lesson (summarize in a paragraph):

•Continuous integration techniques (Sponder, in press)

8. Create the lesson plan according to the teacher's preferred format.

The role of instructional technology is vital in the CIM model because it calls for the media to be well-designed with appropriate cross-discipline learning strategies and meaningful concept integration. These materials can be used for several lessons, with a variety of formats and in different subject areas. Since many teachers create their own instructional media an environmental approach can save them time over the long run. The process, with an example, is as follows:

Step 1. Identify the main subject topic, the lesson subtopics, the important target concepts and the amount of available teaching time.

The curriculum guide or course text will provide the teacher with the main topic, the subtopics and the target concepts. For example a primary four lesson on the neighborhood would read as follows: *Primary 4-Social Studies: The neighborhood at work (topic); People who provide services, people who produce goods (sub topics).* The concepts that should be taught are *what work is, and the kinds of jobs found in the neighborhood.* The amount of teaching time available for the main topic will help to determine how much information can be covered during each lesson and how much curriculum integration can realistically take place. While the teacher has allocated four, one-hour periods for the entire topic, he or she has determined that the lesson's subtopics and target concepts are reasonable for a one hour lesson.

Step 2. Describe the lesson content.

The text or the curriculum guide will also provide the basic lesson content, however, teachers should consult other resources for additional ideas or for their own edification. Using ancillary sources is especially helpful for those teachers who have only a working knowledge of the main subject area. *This lesson will focus on the names and job descriptions of people who provide products, goods, and services in the neighborhood. Students should be able to use their own experiences to identify the major characteristics of most of the positions.*

Step 3. Choose additional integration topics using the Subject Table.

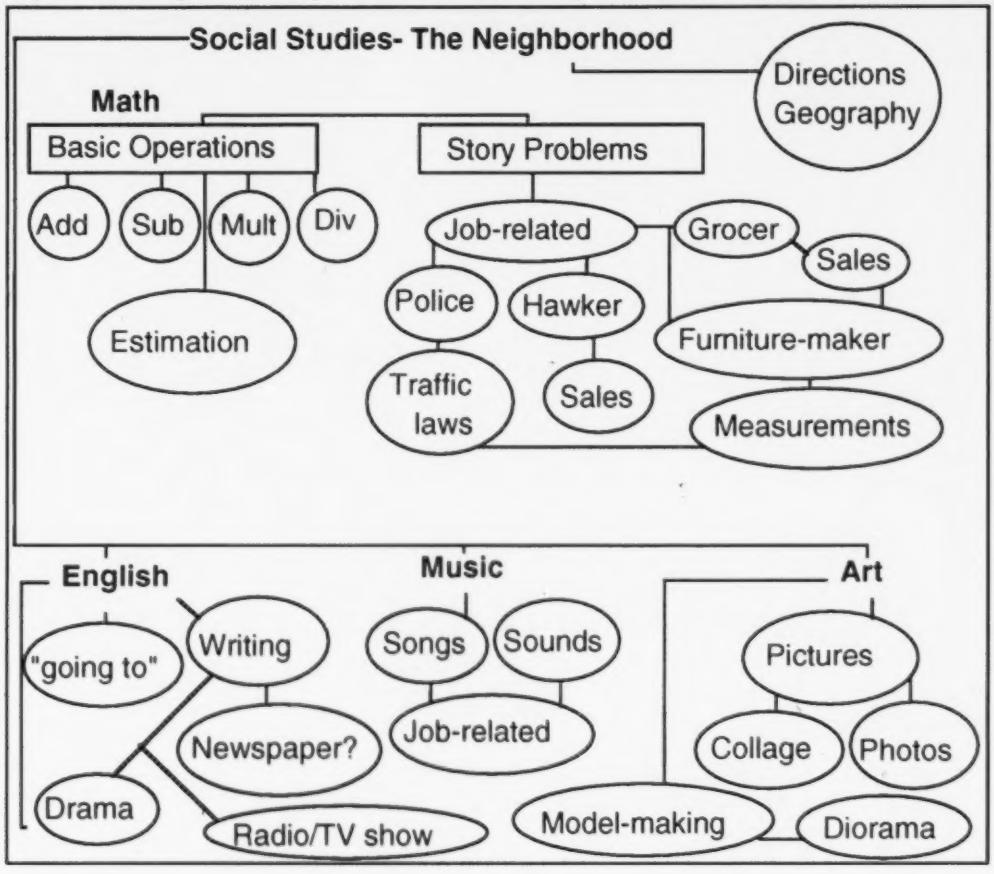
The additional topics are not intended to change the focus of the main topic but rather to add to students' understanding of the underlying relationships that exist between or among them. The success of this step depends upon the teacher's creativity in coupling the main subject to other curriculum areas. For example the teacher considers math or English as possible topics for integration with social studies. If additional combinations surface they can be targeted for use in later lessons.

Bubbling

Bubbling is a visual free-association of words and concepts that can help to clarify ideas or to generate new ones. On paper, the teacher lists topics as they come to mind and explores how they fit together. Figure 2 is an example of how a sample bubbling exercise might unfold. The main topic is written at the top of the page (The Neighborhood) followed by another subject such as math, along with some of the possible integration categories listed in the CIM Subject Table. Since the purpose of the exercise is to generate ideas there are no wrong possibilities. The basic math operations are noted and ideas arise for various story problems. Subsequently the teacher explores English, art and music for additional integration activities.

As the process continues the teacher scopes out a composite lesson based upon activities that will encourage students to write about various neighborhood workers and to solve simple on the job math problems that they might encounter. The lesson framework will evolve from some of the "bubbled" ideas such as creating a newspaper or developing a radio or television program. After reviewing the English curriculum the teacher decides that the grammatical construction *going to* would fit into the lesson by asking questions such as the following: What is the grocer (hawker, furniture-maker, policeman, etc.) *going to* do next? Where is the policeman (hawker, furniture-maker, policeman, etc.) *going to* go next? Finally, the bubbling exercise has generated enough information so that the teacher can now concentrate on the enhanced lesson content.

Figure 2. Sample Bubbling Method for Generating Curriculum Associations



Step 4. Focus on the integrated topic.

After choosing additional topics and determining a conceptual alignment the teacher rewrites the Step 2 lesson summary to reflect the enhanced lesson. *This lesson will focus on the position titles and job activities of people who provide products, goods, and services in the neighborhood and will include practice with the construction "going to." Students will write about neighborhood jobs and estimate the answers to job-related math problems.*

Step 5a and 5b. Decide on the presentation method and the instructional media (These steps should occur in tandem).

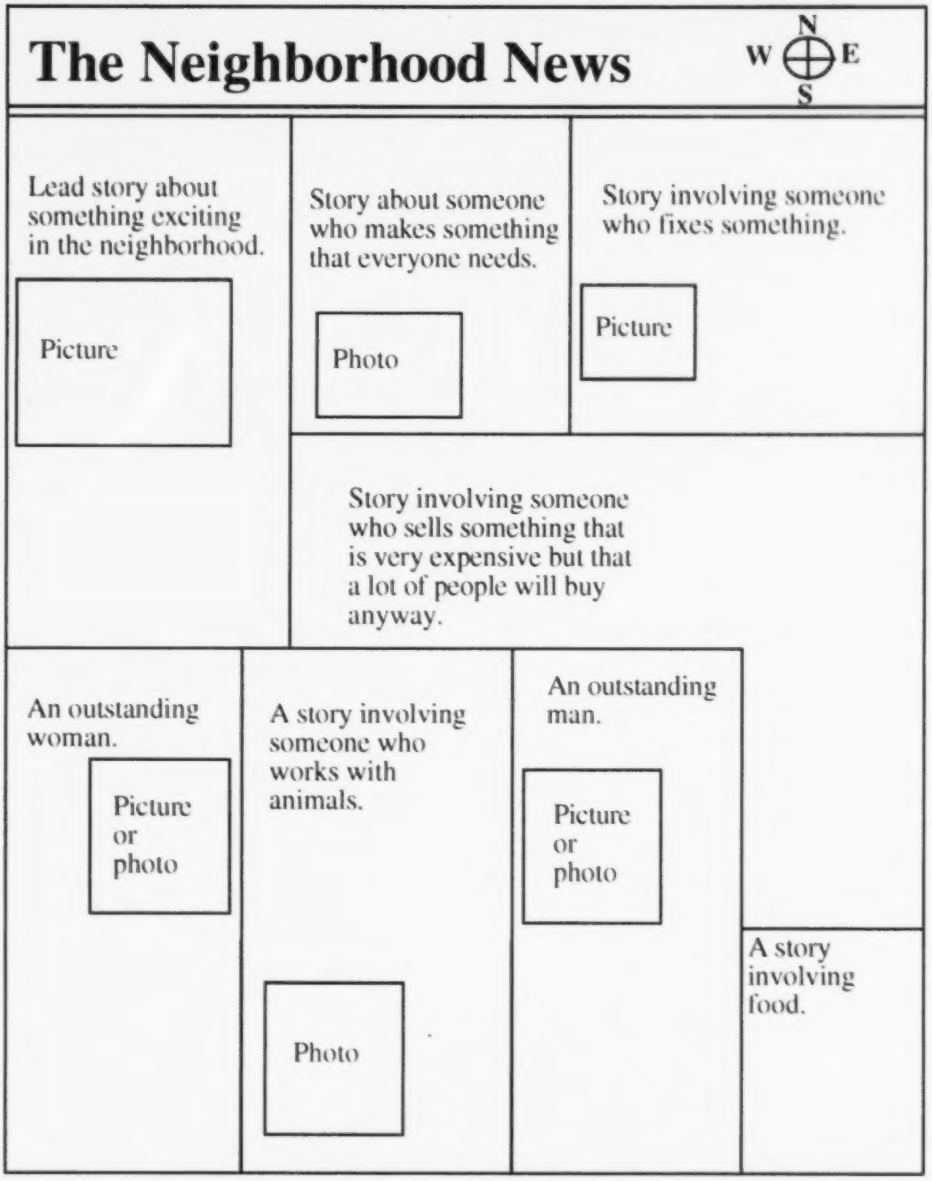
This is an important juncture because it is here that curriculum integration is implemented. Each of these steps should directly influence the other so the teacher can start with either one and go back and forth until both are satisfactorily determined. For example, *The presentation will be activity-based! Because there are a few periods available for this topic the teacher decides that role playing and guided writing activities would be good ways for students to learn the material. Directions for the role-play will be written on a vanguard sheet. The writing activities could be part of a mock neighborhood newspaper and directions for the project will be given on the overhead projector. The stories will be started in class using various pre-writing activities and then finished at home.*

Step 6. Describe or sketch the integrated media.

If the necessary materials are not already available, the media should be created according to good principles of instructional design (Heinich, Molinda & Russell 1993; Merrill, Tennyson & Posey, 1993; Fleming & Levie, 1978) (See figure 3). This step should also guide the creation of the instructional materials after the teacher formalizes the lesson plan. *1. The neighborhood newspaper will be on vanguard sheets that should cover*

a large section of the back wall. The teacher will create the newspaper title and set aside enough space for the different articles. 2. The writing activities will include a pre-writing exercise that will focus on descriptions of workers' daily activities. The OHT directions should encourage the use of the appropriate grammatical structures covered in the English curriculum. 3. Mathematical questions involving grade-level concepts will also be solved as part of the role-play exercise. 4. Job title cards will be prepared in advance and the students will each pick a job to write about.

Figure 3. Sample sketch of an integrated media-A blank class newspaper.


The Neighborhood News
N
W
E
S
Lead story about something exciting in the neighborhood.
Picture
Story about someone who makes something that everyone needs.
Photo
Story involving someone who fixes something.
Picture
Story involving someone who sells something that is very expensive but that a lot of people will buy anyway.
An outstanding woman.
Picture or photo
A story involving someone who works with animals.
Photo
An outstanding man.
Picture or photo
A story involving food.

Step 7. Complete the Matrix by summarizing the process. Rewrite the fully integrated lesson to include information from the previous steps.

By summarizing the information from the CIM the teacher completes the matrix procedure (see figure 4). *This lesson will use a newspaper activity format involving social studies, art English and math, to teach the names, job descriptions and activities of people who work in the neighborhood. Students will take part in a role-play activity, begin stories, draw pictures, solve problems and create a classroom newspaper.*

Figure 4. A Sample of A Completed Curriculum Integration Matrix (CIM) ©Sponder, 1993

1a. Main subject area & topic: *P-4 Social Studies: The neighborhood at work.*
1b. Lesson subtopics: *People who provide services, people who produce goods.*
1c. Lesson concepts: *what work is, the kinds of jobs found in the neighborhood.*
1d. Length of lesson: (30 min /60 min) **•No. of class periods for main topic:** *4*

2. Lesson content: *This lesson will focus on the names and job descriptions of people who provide products, goods, and services in the neighborhood. Students should be able to identify the characteristics of most of the positions from their own experience.*

3. Subject Table:

Math	English	S S	Science	P.E.	Art	Music	Moral Ed
basic facts	writing	local	nature	health	color	song	respect
operations	reading	regional	deduction	skills	form	instrument	culture
story problems	speaking	world-wide	inductive reasoning	sports	cultural expression	dance & movement	self-knowledge

Grade-level concepts for subjects that are covered in the curriculum guide
Prior knowledge, either learned in school or encountered outside of school

4. Integrated topic: *This lesson will focus on the activities of people who provide products, goods, and services in the neighborhood and will include practice with the construction "going to." Students will be able to identify job characteristics and estimate the answers to job-related math problems*

5a. Presentation Method
- •Lecture
- •Demonstration
- •Story
- •Question and answer
- •Group work
- •Writing activities
- •Media
- •Discovery
- •Etc.

5b. Instructional Technology
- •Overhead projector
- •Computer
- •Chalkboard
- •Audiocasette
- •Videocassette
- •Pocket chart
- •Commercial ILS
- •Compact disc
- •Videodisc
- •DVI
- •Writing
- •Posters
- •Realia
- •Puppets
- •Film
- •Filmstrip
- •Television
- •Etc.

6. Integrated media: *1. The neighborhood newspaper will be a large poster that will cover a section of the back wall. The teacher will create the newspaper title and set aside enough space for the different articles. 2. The pre-writing activities will focus on descriptions of workers' daily activities. The OHT directions should encourage the use the appropriate grammatical structures covered in the English curriculum; Mathematical questions involving grade-level concepts will be asked 3. Role-play cards will also be used for selection writing topics will be created. Difficult parts of the names will be hilighted in a second color.*

7. Integrated lesson: *This lesson will use a newspaper activity format involving social studies, art English and math, to focus on the names, job descriptions and activities of people who work in the neighborhood. Students will write stories, draw pictures, solve problems and create a classroom newspaper.*

•Continuous integration techniques such as questioning, writing, grammar etc..

Step 8. Write the lesson plan and, if necessary, create the media .

After the matrix has been completed the teacher can write the lesson plan and, if necessary, create the instructional media. The exercise itself is intended to raise the teacher's awareness of his or her opportunities to develop integrated and environmentally-focused lessons. Hopefully, teachers will internalize the process or develop their own methods for creating integrated lessons.

CONTINUOUS INTEGRATION TECHNIQUES

Step seven cites the use of *continuous integration techniques* that can become part of a standard teaching repertoire. A summary of some of these methods can be found in Sponder (1993).

CURRICULUM INTEGRATION IN SINGAPORE

There have been many successful instances of curriculum integration in Singaporean classroom including the following: Storytelling, music and art (Bonnert, 1980); social studies and morality (Chen & Onn, 1985); English and music (Cheng, 1984); writing and math (Chong & McCracken, 1990; Kaur, 1992); computers and art (Duthie, 1990); history and puppetry (Diploma Class of 1986, 1987); poetry and science (Poon, 1990); math and moral education (Tan, 1982); math and chemistry (Thye, 1987); story-telling and social studies (Tey & Loh, 1986); poetry and geography (Yee, 1988); literature across the curriculum (Yeo, 1985); and food with math, science and language arts (Tng, 1987).

THE IMPORTANCE OF MEDIA IN CURRICULUM INTEGRATION

Instructional media is the one part of a lesson over which teachers have almost total control. Because instructional displays are created before the class they can be systematically designed to reinforce curriculum integration. By using the media as one instructional foundation teachers can save time and provide good models for learning and remembering important concepts.

SUMMARY

Although one of the goals of any educational system is to develop responsible citizens who can protect the environment, the standard practice of teaching subjects as distinct and separate disciplines often works against this aim. The Curriculum Integration Matrix is a tool that teachers can use to develop an integrated curriculum with which to foster an environmental perspective in their students. While not an educational panacea the CIM strategy can help teachers to create and teach integrated, environmentally-oriented lessons.

REFERENCES

Bonnert, E.H. (1980). "Integrated storytelling sessions." *Teaching and Learning*, (1) 1 : 37-44.

Burke, J. (1978). *Connections*. Boston, Ma.: Little, Brown and Company.

Chen, H.C.C., and Onn, Y.S. (1985). "The teaching of social studies through hypothetical moral dilemmas." *Teaching and Learning* , (6) 1: 44-48.

Cheng, L.S.C. (1984). "Learning english through songs." *Teaching and Learning*. (5) 1 : 51-55.

Chong, T.H., and McCracken, N.M. (1990). "Using writing as a mode of learning in mathematics." *Teaching and Learning*. (10) 1 : 61-66.

Dewey, J. (1938). *Experience and education*. New York, New York: Macmillan.

Diploma Class of 1986 (1987). "The use of puppets in history teaching."*Teaching and Learning*. (8) 1 : 103-108.

Duthie, B. (1990). "Computers, art and creativity." *Teaching and Learning*. (11) 1 : 23-27.

Elliot, J. (1993). *Developing community-focused environmental education through action-research*. Plenary paper delivered at the Seventh Annual Conference of the Educational Research Association, September 23-25, Singapore.

Fleming, M and Levie, H. (1978) Instructional message design: Principles from the behavioral sciences. Englewood Cliffs, N.J.: Educational Technology Press.
Heinich, R., Molinda, M., and Russell, J.D. (1993). Instructional media and the new technologies of instruction. New York. John Wiley and Sons.
Lavine, T.Z. (1984). *From socrates to sarte: The Philosophic quest.* Toronto, Canada: Bantam
Merrill, M.D., Tennyson, R.D., & Posey, L.O. (1992). Teaching Concepts: An instructional design guide, Second Edition. Englewood Cliffs, N.J.: Educational Technology Press.
Pirsig, R. (1974). Zen and the art of motorcycle maintenance. New York: Bantam.
Kaur, B. (1992). Writing in the mathematics class.*Teaching and Learning.* (12) 2 : 49-54.
Poon, K.H. (1990). Integrating poetry into science teaching. *Teaching and Learning.* (10) 2 : 61-66.
Schweitzer, A. (1948). *Goethe: Four studies.* Boston, Ma.: The Beacon Press.
Schwenk, T. (1978). *Sensitive chaos: The creation of flowing forms in water and air.* New York, New York: Schocken Books.
Smith, E.E., and Westhoff, G.M. (1992). "Using multimedia for multidisciplinary education." *Educational Technology.* (32) 1: 15-23.
Smith, F. (1986). *Insult to intelligence: The bureaucratic invasion of our classrooms.* Portsmouth, N.H.: Heinneman Educational Books.
Sponder, B. (1993).Techniques for promoting interdisciplinary education in the classroom. *Teaching and Learning.* (14) 1 : 11-24.
Tan, H.L. (1982) A blend of mathematics and moral education. *Teaching and Learning.* (3) 1. : 28-31.
Tey, S.H., and Loh, G. (1986). The importance of story-telling in the teaching of social studies. *Teaching and Learning.* (7) 2 : 73-75.
Thye, J.T.E., (1987). The use of venn diagrams in chemistry. *Teaching and Learning.* (8) 1. : 71-75.
Tng, S.T. (1987). Learning experiences through food. *Teaching and Learning.* (7) 2. : 4-8.
Tong, K.M. (1970). *The educational ideas of confucius.* Tapai: Youth Books.
Yee, S.O. (1988). The use of poetry and prose to enrich the teaching of geography. *Teaching an Learning.* (9) 1.: 45-50.
Yeo, R. (1985). Literature across the curriculum. Guidelines. (7) 1. : 22-33.